AMENDED SPECIFICATION

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PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO AN ASSEMBLY FOR USE IN PROJECTING MULTI-COLOURED LIQUID MOVING IMAGES

(71) I, JAMES DOODY, of 96 Heathview, London W.2, a British subject, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to improvements in projecting multi-coloured liquid moving images, and especially to projecting such images to provide a so-called psychedelic experience.

According to the present invention, there is provided an optical projector for projecting multi-coloured moving images comprising an assembly comprising at least one pair of mutually parallel, overlapping and substantially rigid plates of transparent or translucent material, a plurality of differently coloured mutually immiscible liquid substances enclosed between the or each pair of overlapping plates, means for retaining the or each pair of plates in mutually spaced overlapping relationship and means for retaining the liquid substances between the plates

means for so mounting the assembly that the light beam of the projector is transmitted through the assembly, and

means for rotating the assembly about an internal axis so that the light beam continuously passes through the overlapping plates to project multi-coloured moving images.

One of the liquid substances may comprise water coloured with a water-bassed dye.

One of the liquid substances may comprise vegetable oil coloured with an oil-based dye.

One of the liquid substances may comprise silicon oil.

One of the liquid substances may comprise paraffin.

One of the liquid substances may comprise a soap solution.

One of the liquid substances may comprise a mixture containing vegetable oil, an oil-based dye and liquid paraffin.

An assembly as described above can be made by depositing a coating comprising silicon on the surface of each plate which will come in contact with the liquid substances, assemblying the plates to form the assembly with a gasket between the or each pair of overlapping plates to space the plates apart to define a cavity therebetween, applying a seal round the periphery of the assembly, injecting the plurality of differently coloured immiscible liquid substances in to the or each cavity *via* an inlet or inlets in the peripheral seal and sealing the or each inlet to contain the liquid substances in the or each cavity.

An embodiment of the present invention will now be more particularly described with reference to the accompanying drawings, in which:—

Fig. 1 shows an elevational side view of an assembly for use in projecting multi-coloured moving images;

Fig. 2 shows a view of the assembly in Fig. 1 in the direction of the arrow A of Fig. 1; and

Fig. 3 shows an arrangement for projecting multi-coloured moving images embodying the present invention.

Referring now to the drawings, Fig. 1 shows an assembly 1 forming a composite disc comprising three overlapping sheets of glass which are indicated by the references

2, 6 and 3, respectively. The sheets of glass are arranged with their major surfaces parallel to one another, and between the inner sheet of glass 6 and each of the two outer sheets of glass 2 and 3, respective cavities 8 and 7 are provided. The outer sheets of glass 2 and 3 are separated from the inner sheet 6 by means of rings of strip material, preferably aluminium foil, which are indicated by the references 4 and 5 and which are preferably affixed to the surfaces of the glass by means of an adhesive substance. These rings of strip material form gaskets which space the adjacent sheets of glass apart to define cavities therebetween.

As will be described in greater detail hereafter, various differently coloured mutually immiscible liquid substances are contained in the respective cavities 8 and 7 are retained therein by means of a suitable sealing means which is applied to the circumferential surfaces 9.

In order to project the edges of the circular glass sheets from damage, the circumference of the composite disc formed by the sheets may be inserted in an annular rubber tyre (not shown in the drawings).

Fig. 2 shows a view of the disc 1 in the direction of the arrow A of Fig. 1 and illustrates the pattern 10 formed by the various differently coloured liquid substances enclosed in the cavities 8 and 7.

As indicated in Fig. 3, the composite glass disc 1 is rotatably mounted in an optical projector system comprising a light source 30, a heat filter 31 and an optical condensor 32, arranged on one side of the composite disc 1; and a lens 38 and a screen 39, disposed on the other side of the composite disc 1. The disc 1 is rotatably mounted by means of a shaft 33, which is coupled by friction drive wheels 34 and 35 to a shaft 37 of an electric motor 36.

The composite disc 1 is located in the focal plane of the lens 38 and moving images of the differently coloured portions of the disc 1 are projected on to a screen 39 while the disc slowly rotates.

As the disc 1 rotates, the various differently coloured liquid substances in the cavities in the composite disc 1 flow between the surfaces of the adjacent pairs of plates and produce, by the varying patterns formed by their interfaces, a multi-coloured kaleidoscopic display of constantly changing liquid images on the screen 39. The flow patterns between the various liquid substances in the cavities of the composite disc 1 change in response to changes in the viscosity of the substances, and hence in response to changes in the ambient temperature in the vicinity of the composite disc.

Expediently, the surfaces of the glass plates between which the various liquid substances are enclosed when the assembly process has been completed, are treated with a suitable silicon compound which is sprayed over the surfaces to cover them with a thin film. This film is then allowed to dry before the plates are assembled together and the various liquid substances are introduced into the cavities formed between the adjacent plates. It has been found that this coating substantially reduces any tendency for the liquid to adhere to the surfaces and so facilitates the flow of liquid as the assembly is rotated to project the moving liquid images.

It has been found that the thickness of the centre sheet of the glass 6 is critical, if the liquid films formed in the respective cavities on either side of the sheets 6 are to be accurately and simultaneously focussed by the lens 38 on the screen 39. It has been found that optimum results are obtained when the thickness of the centre sheet of the glass 6 has a thickness of 0.81 millimetres. The thickness of each of the two other glass sheets 2 and 3 is preferably between 1.2 and 1.5 millimetres and the thickness of the cavities formed between the adjacent sheets is preferably of the order of 1 millimetre.

Although, in the embodiment described the composite disc 1 comprises three sheets of glass, the assembly may be formed by any plurality of such sheets.

In the embodiment which is described with reference to the drawings, the composite disc 1 is rotatably mounted by means of a central shaft 33 and is disposed eccentrically with respect to the optical axis of the lens 38. However, a disc assembly embodying the invention may also be rotatably mounted by means of a circumferential race, or other suitable means, surrounding the circumference of the disc 1. In these circumstances, the disc may be rotated, for example, by means of a friction drive engaging the periphery of the disc or of an annular tyre surrounding the circumference of the disc. The disc may also be rotatably mounted with its centre aligned with the optical axis of the projector.

Preferably, the edges of the circular glass sheets are sealed together by a suitable adhesive cement, such as that sold under the Registered Trade Mark Bostic-7, before the liquid substances are inserted in the cavities between the adjacent sheets of the glass. In order to ensure a satisfactory seal, the composite disc assembly is then baked in an oven at a temperature of approximately 100°C for about ten minutes, during which time the adhesive cement hardens. The liquids are then injected through the seal by means of, for example, a hypodermic syringe, together with a drop of liquid soap which serves to keep the surfaces of the glass clean and to facilitate the flow of the liquids when the composite disc is rotated in use. The gap formed by the passage of the hypodermic needle is then sealed with a suitable adhesive cement.

Alternatively, the adjacent peripheral portions of the circular sheets of glass may be fused together by applying heat to the peripheral portions of the disc, for example, by means of rotating the disc so that its periphery passes through a flame. The liquids are then introduced into the cavity defined between the overlapping glass sheets and the inlet through which the liquids are injected is sealed with a suitable adhesive cement.

The liquid substances introduced into the cavities in the composite disc preferably comprise three components substances, namely:

1. Water suitably coloured with a water-based dye;

2. Vegetable oil suitably coloured with an oil-based dye; together with a suitable quantity of liquid paraffin; and

3. Silicon oil which may be left clear, in which case its subsequently becomes coloured by absorbing deposits from the other liquid substances in the cavity, or which may be suitably coloured.

Preferably, the vegetable oil has viscosity of approximately 20 centistokes and the mixture formed by the addition of the liquid paraffin has a viscosity of about 150 centistokes.

The viscosity of the silicon oil is, preferably, in the range of 200 centistokes to 1000 centistokes. It has been found that the silicon oil supplied by Midland Silicons Ltd., is particularly suitable for this purpose.

Small quantities of suitable gaseous materials may also be injected into the cavities between the plates.

It has been found that the second constituent referred to above, may advantageously be prepared by heating a suitable quantity of vegetable oil for example, a large teaspoon full — until it boils, and then adding a suitable quantity of the oil-based dye to colour the resulting component. The vegetable oil and the dye are then stirred until the dye disperses into the vegetable oil and finally, the requisite quantity of liquid paraffin is added to complete the mixture. The mixture is then allowed to cool while any deposits are filtered out. It has been found that colouring the mixture yellow provides a particularly pleasing kaleidoscopic effect when the multi-coloured moving images are projected onto the screen.

WHAT I CLAIM IS:—

1. An optical projector for projecting multi-coloured moving images comprising

an assembly comprising at least one pair of mutually parallel, overlapping and substantially rigid plates of transparent or translucent material, a plurality of differently coloured mutually immiscible liquid substances enclosed between the or each pair of overlapping plates, means for retaining the or each pair of plates in mutually spaced overlapping relationship and means for retaining the liquid substances between the plates;

means for so mounting the assembly that the light beam of the projector is transmitted through the assembly, and

means for rotating the assembly about an internal axis so that the light beam continuously passes through the overlapping plates to project multi-coloured moving images.

2. A projector as claimed in claim 1, wherein one of the liquid substances comprises water coloured with a water-based die.

3. A projector as claimed in either of claim 1 or claim 2, wherein one of the liquid substances comprises vegetable oil coloured with an oil-based dye.

4. A projector as claimed in any one of the preceding claims, wherein one of the liquid substances comprises silicon oil.

5. A projector as claimed in any one of the preceding claims, wherein one of the liquid substances comprises paraffin.

6. A projector as claimed in any one of the preceding claims, wherein one of the liquid substances comprises mineral oil other than silicon oil.

7. A projector as claimed in any one of the preceding claims, wherein one of the liquid substances comprises a soap solution.

8. A projector as claimed in any one of the preceding claims, wherein one of the liquid substances comprises a mixture containing vegetable oil, an oil-based dye and liquid paraffin.

9. A projector as claimed in claim 3, wherein the vegetable oil has a viscosity equal to approximately 20 centistokes.

10. A projector as claimed in claim 4, wherein the silicon oil has a viscosity in range of 200 to 1000 centistokes.

11. A projector as claimed in claim 8, wherein said mixture has a viscosity substantially equal to 150 centistokes.

12. A projector as claimed in any one of the preceding claims, further comprising a plurality of bubbles of gaseous substances in the liquids between the plates.

13. A projector as claimed in any one of the preceding claims, further comprising a gasket located between the or each pair of adjacent plates and disposed around the periphery of the plates to maintain a predetermined spacing between the or each pair of adjacent plates.

14. A projector as claimed in any one of the preceding claims, further comprising a hard-setting substance disposed in contact with peripheral portions of the plates to form a seal for retaining the liquid substances between the plates.

15. A projector as claimed in claim 14, wherein the hard-setting substance comprises an adhesive.

16. A projector as claimed in any one of the preceding claims, wherein the mounting means comprises a shaft passing through or

attached to the centre of the assembly, and the assembly is rotatably mounted by means of the shaft.

17. A projector as claimed in any one of claims 1 to 15, wherein the mounting means comprises a mounting member engaging the periphery of the assembly and the assembly is rotatably mounted by means of the mounting member.

18. A projector as claimed in any one of the preceding claims, wherein the assembly comprises a central plate and two outer plates of translucent or transparent material which are disposed to form respective cavities on each side of the centrally located plate.

19. A projector as claimed in claim 18, wherein the thickness of the central plate is substantially equal to 0.81 millimetres.

20. A projector as claimed in any one of the preceding claims, wherein each of the plates of translucent or transparent material comprises glass.

21. A projector as claimed in any one of the preceding claims, wherein each of the plates is circular.

22. A projector for projecting multi-coloured moving images, substantially as herein described with reference to the accompanying drawings.

23. A projector as claimed in any one of claims 1 to 22 wherein the assembly has been manufactured by depositing a coating comprising silicon on the surface of each plate which will come in contact with the liquid substances, assembling the plates to form the assembly with gaskets between the or each pair of overlapping plates to define a cavity therebetween, applying a seal around the periphery of the assembly, injecting the plurality of differently coloured immiscible liquid substances into the or each cavity *via* an inlet or inlets in the peripheral seal and sealing the or each inlet to retain the liquid substances in the or each cavity.

24. A projector as claimed in claim 23, wherein the step of applying a seal around the periphery of the assembly comprises the step of applying a hard-setting substance.

25. A projector as claimed in claim 24, wherein the hard-setting substance comprises an adhesive, and comprising the further step of baking the assembly at a temperature of approximately 100°C for a period between 5 and 10 minutes after the hard-setting substance has been applied to the periphery of the assembly but before the plurality of liquid substances are injected into the or each cavity.

26. A projector as claimed in claim 23, wherein step of applying a seal around the periphery of the assembly comprises the step of applying heat to fuse peripheral portions of the adjacent plates together before the plurality of liquid substances are injected into the or each cavity.

27. A projector as claimed in any one of claims 23 to 26, wherein each said liquid substance is prepared by boiling a requisite quantity of vegetable oil, adding a suitable quantity of the oil-base dye to the boiling vegetable oil, mixing the vegetable oil and the dye together until the dye disperses into the vegetable oil and then adding an appropriate quantity of liquid paraffin.

28. A projector as claimed in claim 27, wherein the mixture is allowed to cool and the deposits are filtered out before being injected into the or each of the cavities.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig. 1.

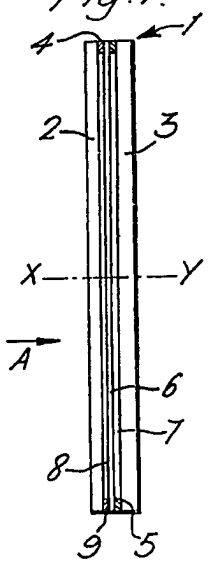

Fig. 2.

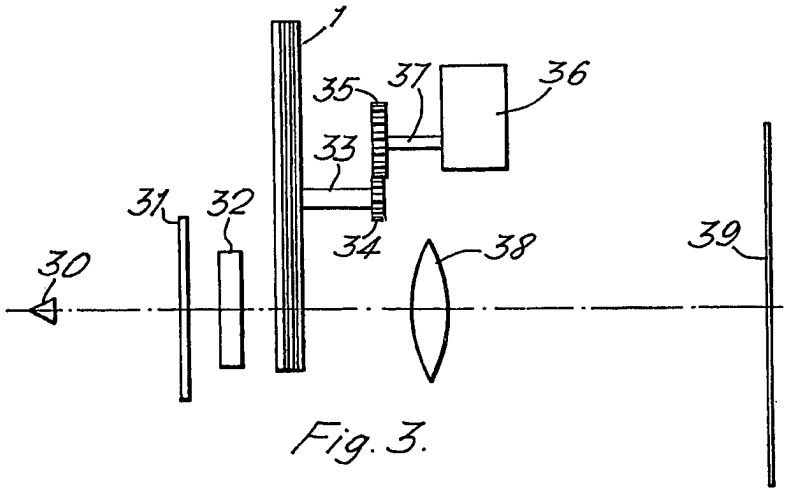

Fig. 3.